Assessment Branch

Annual Report 2000

Office of Water Quality

Preface

The purpose of this annual report is to document the Office of Water Quality's Assessment Branch accomplishments in 2000 and to list goals for 2001. The Section Chiefs of the Surveys, Biological Studies and Environmental Toxicology & Chemistry Sections have prepared summaries of respective responsibilities, activities, achievements for the year and to outline goals for the coming year. A listing of personnel assigned to the Branch appears at the end of the report.

The "Surface Water Quality Monitoring Strategy" is the template used by the Branch to achieve the agency's overall goal of **Restoring and Protecting Indiana's Surface Water Quality**. We accomplish this goal by obtaining primary field data, taking measurements and making observations on a near daily basis of selected river, stream and lake locations.

The monitoring activities, sampling events and technical evaluations of Indiana's surface waters are focused to produce timely results that support the mandates of the Branch. Those mandates are derived from the 305 (b) Water Quality Report; 303 (d) Total Maximum Daily Load (TMDL) Program; the National Pollutant Discharge Elimination System (NPDES) Permitting and Compliance Program; the annual Fish Consumption Advisory (FCA), Drinking Water Program Assistance; and IDEM Commissioner Initiatives/Priorities.

The White River Contamination event (a.k.a., the Fish Kill Incident) during late December 1999 and early winter months of 2000 along with restoration activities in the spring of 2000 required considerable staff time and resources. Virtually everyone assigned to the Branch was involved and played an active role in one or more of the many incident activities. The activities included obtaining water, sediment, fish tissue or biological samples and transporting those samples to contract or State-operated laboratories for testing/analyses. Additionally, staff collected dead fish from the river for proper disposal, processed sample data/information, performed QA/QC on the samples obtained and prepared the data/information for presentation to attorneys. Staff was also actively involved in the preparation of depositions, the evaluation of data/information, and the preparation of technical reports. The estimated Assessment Branch personnel supported this major environmental emergency with approximately 2700 hours of compensatory and non-compensatory hours, roughly equivalent to one and one-half work years.

Later in the year (July 2000), the Assessment Branch was called upon to conduct comprehensive studies in support of a fish kill on Eagle Creek Reservoir. Due to considerable public outcry of poor drinking water taste and odor, a contractor for the Indianapolis Water Company added a copper-based licensed, aquatic herbicide to the reservoir's waters in an attempt kill the algae that they believed was responsible for most of the offensive taste and odor. A massive fish die-off occurred immediately after the herbicide application. About 300 hours were dedicated to this emergency project.

Taken together, both of these major environmental emergencies resulted in concomitant losses of significant staff time and resources from our normal responsibilities. Hence, delays were evident in analytical evaluations of ongoing assessment projects, preparing technical monitoring reports, responding to routine requests from data users, and standard report writing.

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Assessment Branch

The Water Quality Assessment Branch is responsible for assessing the quality of water in Indiana's surface waters (rivers, streams, and lakes). Virtually every element of the Surface Water Quality Management Program of IDEM is related (directly or indirectly) to one or more activities currently carried out by this Branch. The biological and surface water monitoring activities identify stream reaches, watershed basins or segments where physical, chemical and/or biological quality have been or would be impaired by either point or non-point sources.

The Assessment Branch is composed of three sections which work together to collect data and assess the quality in Indiana's surface waters.

Surveys Section is responsible for sampling and assessing the quality of waterways and determining the effect of approximately 1,800 permitted point sources on receiving streams. They will provide data for water models, 305(b) water quality reports and waste load allocations for NPDES permitting purposes, as well as an assessment of non-point sources.

Biological Studies Section conducts fish and macroinvertebrate community studies as well as habitat assessments to establish biological criteria to which all other streams may be compared. The purpose of the comparison is to identify impaired streams or watersheds. In addition, this Section conducts fish tissue and sediment sampling to identify toxic and bio-concentrating substances that are measured by water monitoring programs. Fish tissue data serve as the basis for Fish Consumption Advisories, which are issued to protect the health of sport and subsistence fishermen. The Section also participates in the development of site-specific water quality standards.

Environmental Toxicology and Chemistry Section develops the sediment criteria, reviews whole effluent toxicity data and reports, metals translator study requests and data reports, and evaluates requests for site specific water quality and water quality standards. The section also reviews data involving investigations of toxic releases to the environment, provides quality assurance review of data collected during field studies and laboratory analyses. Additionally, develop and/or reviews sampling and analysis work plans for compliance with quality assurance project plans, and oversees development of Total Maximum Daily Loads for Impaired Waterbodies that are on the 303(d) list.

Surveys Section

Responsibilities and Organization

Surface Water Quality Monitoring Strategy (rev.1998).

Four organized workgroups and four specific subgroups carry out the stated goals of the SWQMS (rev.1998):

- Fixed Station Work Group;
- Watershed Monitoring Work Group;
  - Probabilistic Sampling Program
  - Source ID Sampling Program
- Special Project Work Group;
  - *E. coli* Monitoring Program;
  - Pesticide Monitoring Program, and;
- Data Work Group

As established by the Monitoring Strategy, the Section began a five year, rotating basin study of the State's ten major watersheds in 1996 while continuing to operate the Fixed Station Monitoring Program. Year 2000 marked the first complete cycle of the five-year rotation. One-fifth of State waters are assessed each year by a probabilistically selected intensive sampling effort conducted in the targeted basin. Hydrological and water quality data provided by the Section is reviewed by the Environmental Chemistry and Toxicology Section and integrated with the Biological Studies Section data. The SWQMS was revised in 1998 due to staffing limitations, but still maintains the five year, rotating basin schedule. Data from the Fixed Station, Watershed and Special Projects Programs provides important information about:

- Trends over time (years);
- Trends over seasons (seasonality);
- Targeted Drinking Water Source Water Monitoring;
- Ambient Surface Water Quality;
- Sources of Impairments;
- Assessment of all surface waters in the State using the probabilistic approach; and
- Compliance and Enforcement sensitive issues.

The revised strategy *(SWQMS rev. 1998)* will continue to contribute significantly to an improved planning processes throughout OWQ. This plan should initiate the development of interrelated action plans which encompass the wide range of OWQ responsibilities, such as rule making, permitting, compliance, Total Maximum Daily Load (TMDL) Programs and plans, nonpoint source issues, and wastewater treatment facility oversight.

Fixed Station Work Group:

Accomplishments in 2000:

During the year 2000, the Fixed Station Monitoring Program continued to carry out a key role in the Surface Water Quality Monitoring Strategy of the Office of Water Quality. The primary purpose of the Fixed Station Program is to provide analytical data to aid with the assessment of the major rivers of Indiana. An IDEM document, in process, titled *Indiana Water Quality Fixed Station Program 2000-Monitoring Station Records-Rivers and Stream* will summarize all of the data from this statewide program for 2000. The current number of Fixed Station locations is 160 statewide.

Fixed Station Work Group (Continued):

Accomplishments in 2000:

Each site is sampled once per month for a variety of parameters depending on the nature and history of the site. This frequency of sampling provides for a comprehensive data set for statistical analyses.

In accordance with the Assessment Branch Monitoring Strategy, the Great Lakes and the Ohio River Basin were the focus of study for the year 2000. A Fixed Station report for this specific area is in preparation. Fixed Station data from these basins will be analyzed using various means to look for trends and Water Quality Standards violations. Since the focus of the Fixed Station Program has been on the major rivers of the state, it is logical to continue to use these sites as targeted locations, particularly since a wealth of historical data exists from many of these sites. On some of the larger rivers, sites are located spatially with a high enough frequency to give a good representation. In other areas, sites are sparse, but they are still useful to provide general ambient data for use in planning and modeling for NPDES permits. They are also useful as representative data for the particular type of land use upstream of the site. The data from these sites complement the data from the Watershed Monitoring Program of the Surveys Section to give an overview of the chemical and physical Water Quality for the study area. The Watershed Monitoring Program uses a statistically valid number of randomly selected sites on lower order streams throughout the selected study area. In 2001, the 2000 Fixed Station data will be used to produce an additional report for the Indiana rivers that contribute to the Great Lakes and Ohio River basins.

Summary Statistics

Total Numbers of sites sampled for the year 2000 equals 160 sites sampled monthly state- wide.

Total Number of times sites were sampled = 160 X 12= 1,920.

A variety of types of samples are collected at each site each time it is sampled based on each site's history and requirements for assessment. Approximately 8,000 one Liter samples were collected and approximately 60,000 field and laboratory determinations were made on these samples. In addition, numerous bacteriological samples were collected based on holding time restrictions.

All of this data will be entered into the section database, checked for Quality Control and made available for the new STORET entry.

Goals for 2001

Two major documents are being prepared with the Fixed Station 2000 data:

Indiana Water Quality Fixed Station Program 2000-Monitoring Station Records-Rivers and Streams summarizes all of the data from the statewide program for 2000.

Fixed Station Monitoring in the Great Lakes and Ohio River Basin, 2000
This will be a statistical analysis of the data collected in these basins based on the requirements of the Monitoring Strategy.

Fixed Station Historical data will be reviewed and put into annual report format for previous years with use of the section's new AIMS data base.

All of this information will be available for dissemination on the Internet once that capability is achieved.

The current 160 sites will continue to be monitored with the data being entered in the section's database and Quality Control checks will be accomplished.

Goals for 2001 (Continued)

Other activities planned include a continued review of the physical character of the sampling site by making field inspections of the upstream areas. This will be in combination with map reviews including GIS reviews. In addition, a Parameter review for all sampling locations will be continued. This will be accomplished using a Data Use Survey, which was conducted in 2000, that was directed to each section in the Office of Water Quality.

The section is also planning to look at the creation of a new numerical water quality index based on the sampled parameters. The Fixed Station Group will be an integral part of this effort.

Watershed Monitoring Work Group:

Accomplishments in 2000

Probabilistic Sampling Program:

The Watershed Monitoring Workgroup continued the probabilistic sampling program of rotating basins in the year 2000. Randomly chosen (probabilistic) sites in the Ohio River Tributary Basins and Great Lakes Basins were sampled to create a valid statistical representation of these waterbodies. The probabilistically chosen sites were selected by the United States Environmental Protection Agency's Environmental Research Laboratory in Corvallis, Oregon. The primary purpose of this program is to assess all river miles in support of the State's 305(b) reporting obligations as well as to serve numerous other stakeholder needs. The data gathered will be analyzed by various statistical methods in order to produce basin water quality reports and to estimate the total number of impaired miles in both the Ohio River Tributaries Basins and Great Lakes Tributaries Basins.

In 2000 a total of 54 and 44 sites were sampled in the Ohio River Tributary Basins and Great Lakes Basins respectively. All sites were analyzed for in situ field parameters in addition to water chemistry sample collection for laboratory analysis. *In-situ* field parameters and water chemistry samples for laboratory analysis were collected at all sites. Laboratory analyses included general chemistry, nutrients, metals, and cyanide. Each of the sites was collected during three distinct periods in order to evaluate some seasonality and water quality at various stream stages. These sample event periods were conducted from May through June, July through August, and September through October.

Source Identification Program:

According to USEPA advisement, the identification of causes and sources of impaired waterbodies has been an area that States need improvement. As a step in addressing this issue, the Watershed Group initiated the Source Identification Monitoring Program in 2000. This program evaluated data produced by all monitoring programs in 1999 in the Kankakee and Lower Wabash River Basins with the intent of determining the cause of the identified impairments. These impaired conditions were evaluated and prioritized according to the degree and type of impairment for conducting individual follow-up studies. Sixteen intensive studies for source identification were conducted in the Kankakee and Lower Wabash Basins in 2000. These studies ranged from site specific problems involving a few samples to intensive sampling of the complete 11 digit hydrologic unit encompassing the Busseron Creek drainage watershed with prevalent acid mine drainage impairments.

Goals for 2001

The probabilistic program will be continued through the rotating basin approach as set forth in the Surface Water Quality Monitoring Strategy. Fifty probabilistically selected sites will be sampled in both the West Fork White River and the Patoka River Basins this coming year. The Source Identification Program will be continued in the Ohio River Tributaries Basins and Great Lakes Basins this year. The purpose is to identify as many sources of impairments, as resources will allow.

Goals for 2001 (Continued)

An effort to complete all current pending reports will be made for this year that will include:

- *The Lower Wabash River and Kankakee River Probabilistic Report,*
- *The Paired Study Report*
- *Source Identification Reports*
- *The Ohio River Probabilistic Report*
- *The Great Lakes Probabilistic Report*

Other goals to be continued include:

- The development, improvement, and usability of the AIMS database
- The improvement of QA/QC methods both in the field and in data handling
- The improvement and enhancement of the current Watershed Work Groups physical description sheets in order to make this a more valuable tool in characterizing and describing all sampling sites
- The development of better and more efficient methods to identify causes and sources of impairments for improving water quality

Special Project Work Group:

Water Quality Violations and Fishkill Investigations:

Accomplishments in 2000

1. White River: Staff helped investigate the causes of a fish kill on the White River. These duties included investigating the Guide Corporation wastewater treatment facility, sampling the sediments in the river below the Anderson Municipal Wastewater Treatment Plant, and collecting water samples from Anderson to Spencer. Staff assisted the Emergency Response on-scene coordinator with the use of the section's boats, motors, and staff to collect the dead and floating fish.

2. Eagle Creek Reservoir: Staff assisted in limnological studies of Eagle Creek Reservoir as stated in the previously mentioned fish kill.

3. A fish kill in Muscatatuck River, reported by the Department of Natural Resources to IDEM's Office of Enforcement in July 1999 was believed to have occurred because of the effects of wastewater discharge near Austin. The discharge entered Muscatatuck River when the river had reduced stream flow. Observations at the time of the fish kill indicated water in the river had become black in color. An investigation was conducted to determine if the wastewater treatment facility had produced an effluent that may have violated water quality standards, thus causing the fish kill. The investigation documented one instance of pH standard violation. Because of the inability to replicate the exact conditions of the waterway at low flow, the investigation was inconclusive in establishing cause.

4. White River has been monitored nearly every summer since 1994 because of past fish kills that occurred upstream of the mixing zone of the Belmont MWTP effluent. Water quality violations caused by raw sewage bypasses and primary treatment overflows during White River low stream flow periods have been linked to past fish kills. Water temperature has been elevated in the pool upstream of the Indianapolis Power & Light Stout dam when the stream flow reached the typical summer low flow level. Monitoring for these water quality violations continued through the summer of 2000, but stream flow never dropped to the levels when problems occurred previously.

5. The discharge of commercial process wastewater enters White River via a small ditch downstream of IPL Stout power plant and upstream of I-465. The discharge stream indicated no biological growth. Samples revealed that total dissolved solids and sulfate water quality standards were exceeded.

Water Quality Violations and Fishkill Investigations (Continued):
Accomplishments in 2000

A memorandum was forwarded to the responsible permitting authority to indicate sampling results. Past sampling records indicate violations for suspended solids. On a historical note, a Notice of Intent (NOI) letter has been sent to the facility on a matter before this incident.

6. In 1999, a fish kill that occurred in Little Lick Creek in Hartford City. The fish kill was caused by a discharge of commercial anaerobic process wastewater. The discharge occurred through a broken field tile located under the spray application field. During the low stream flow of summer months, no water quality problems occurred. Staff discovered that the company went out of business.

7. Every year, in spring and late fall, the Agency receives a number of telephone calls reporting patches of foam observed floating on stream surfaces. From field observations, and literature studies, foam is attributable to fermentation occurring around tree seed buds that have fallen into the water. In late summer, small 1"-2" patches of foam rise to the surfaces as the result of gas bubbles formed beneath and lifting them to the surface of the water. Because of the heightened public awareness and concern for the White River following the fish kill incident, the number of reports as a result of public observation increased. Specifically, the public response to foam reporting has been centered on a misconception that the foam can be attributed to chemical releases similar to those that caused the Anderson/Guide fish kill. Consequently, a public notice is being developed to answer many of the telephone inquiries regarding naturally occurring foam.

Goals for 2001

Implementation of Clean Sampling Techniques in Conjunction With Ultra Clean Metals Analyses
False positive results at or near the various water quality standards have been the reason for Indiana, and other states, to look at "clean sampling techniques" and ultra clean metals analyses. More stringent water quality standards, driven by the Great Lakes Initiative and adopted by surrounding Great Lake States, supports the development of metals sampling and analyses nanogram levels. The proposed clean sampling techniques in conjunction with ultra-clean metals analyses initially occur on a limited scale. The initial goal is sample 24 sites quarterly in order to test feasibility and to determine if contract labs can reproducibly meet or surpass the IDEM proposed reporting limits.

A landowner complaint has lead to the supposition that there may be water quality violations in William Baker Ditch and possibly the Tippecanoe River. It is the intent of the Surveys Section to sample the area in question to determine if water quality violations have occurred.

Continuation of White River Studies Affected by Indianapolis Belmont MWTP and Indianapolis Power & Light Stout Power Plant. These studies will continue as planned for 2001 if White River stream flow and temperature conditions reach similar levels of those associated with previous fish kill situations involving water quality violations.

E. coli Monitoring Program
Accomplishments in 2000

A highly successful initial year for the Statewide *E. coli* Monitoring Program validated the use of the new mobile laboratory to process samples requiring 6-8 hour holding times. The specifications developed by staff and the subsequent guidance documents have been found sufficient for adaptation and replication by other areas of the Assessment Branch.

E. coli Monitoring Program (Continued):
Accomplishments in 2000

The $44, 479 grant for this project provided for cargo van with a long wheelbase; the van's conversion to provide a standing high workspace; and the required laboratory equipment and supplies for an estimated two-year period. The only unanticipated need was an improvement over the initial incubators. The program has requisitioned a 35° C BOD incubator, whose anticipated cost will not exceed $1,200.00. The ambient incubators used during the 2000 field season will provide adequate back-up for the newer incubator, if necessary.

The program conducted three 5-week surveys in the Great Lakes Basin during the 2000 field season. The first survey assessed 38 sample sites in six northeastern counties. The second survey assessed 25 sample sites in the Lake Michigan Basin and encompassed three northwestern counties. Concurrently, the laboratory was displayed for 10 days at the Indiana State Fair in the Governor's Health Park. The third survey assessed 27 sample sites in five counties, during which time four additional staff persons were trained on the *E.coli* testing laboratory procedures.

Data management for both field sampling and the operation of the laboratory has presented considerable challenge to staff over the season. The Data Work Group and the AIMS contractor worked closely during the project development and execution to provide a data entry platform for field use. Seven hundred and seven samples, inclusive of all QA/QC tests, were analyzed and entered into the AIMS database during the surveys.

A full report of the Great Lakes *E. coli* results will be completed before the June 30, 2001 end of the 319 Grant period.

USGS Studies *E. coli* in the Ohio Tributaries
For a third year, the Indiana District of the Geological Survey, U.S. Department of the Interior and IDEM entered into a joint project under the Federal-State Cooperative Water Program to survey recreational surface water. Their study assessed forty sites during two five-week periods in June and July.

Results will be published in 2002, but we have received the preliminary results of that survey. The 1998 Upper Wabash Report was published this year. The 1999 Kankakee and Lower Wabash Report is approaching final approval and will be published as the backlog allows.

Special Surveys for *E. coli*
Staff assigned to the mobile laboratory conducted two source identification surveys along the Yellow River Basin from Wyatt, IN to the Yellow River USGS Gage Station, south of Bremen, IN. The source identification surveys consisted of a wet weather and a dry weather-sampling event. The mobile laboratory was also utilized for a similar two-event study of the Illinois River near Rensselear, IN.

While travelling to NE Indiana, staff returned to the site of the 1999 investigation in Hartford City (Blackford Co.) to conduct follow-up observations. Staff sampled various sites as time allowed determining the bacteriological status of Little Lick Creek. A separate two-day survey was conducted in September after the closure of the facility that had initially caused the problems.

Goals for 2001

Work plans for the Watershed Assessment portion of the Statewide *E. coli* Monitoring Program will include 100 sites in the West Fork of the White River and Patoka River Basins. Refined versions of the quality assurance plan, guidance documents and data management forms for the mobile laboratory will accompany the 2001-work plan. Staff will be assisting and advising the Total Maximum Daily Load (TMDL) Program in both the planning and the execution of surveys on Impaired Waterbodies in these same watersheds.

Goals for 2001(Continued):

A statewide survey of the county health departments and IDNR Conservation Officers will be conducted to update information about recreation areas on the rivers and streams of Indiana. This information was last gathered in 1987.

Pesticide Monitoring Program:
Accomplishments in 2000

During the past year, the Pesticide Monitoring Program has completed the fourth year of the five-year monitoring strategy. Sampling for pesticides was conducted in the Great Lakes and Ohio River Watersheds. Twenty-three sites were sampled sixteen times in the months March through July. In the Great Lakes watershed, fifteen sites located on tributaries of Lake Michigan and Lake Erie were sampled. The additional eight sites were located on tributaries of the Ohio River.

Additionally staff worked on reporting the pesticide data from 1998 and 1999. The 1998 pesticide report, "An Assessment of Pesticides in the Upper Wabash River Basin" is in the final edit stage, and the 1999 draft report has been prepared.

Surveys Data Group:
Accomplishments in 2000

The Data Group, as a part of the Surveys Section, is charged with the responsibility to oversee the management and dissemination of information by the Surveys Section. To that end, the Data Group was involved in the following activities during 2000:

Publications
Reports*:* Four reports have been completed, bringing the total number of published reports for the Section to 24 since 1996, the first year of the Monitoring Strategy. The Data Group maintains responsibility for final editing, publication and distribution of documents produced by the Surveys Section.

Sampling Plans*:* In addition to the standard reports cited above, the Data Group also completed publication and distribution of 11 Sampling Plans produced by the Section.

Internet: As a final step in the publication process, documents produced by the Assessment Branch are published on the Internet. The Surveys Section currently has five reports and six fact sheets available on the Assessment Branch Web Site. Reports are provided for the web site in ".pdf" format for ease in viewing and downloading. In addition to Surveys Section Internet activities, the Data Group has provided assistance in placing documents on the Internet to other Assessment Branch sections.

Provide GIS Support
Mapping and graphical representation of data are provided to the Surveys Section and the Assessment Branch staff, as well as other Agency personnel by the Data Group. This is an important element in the reporting process and is in much demand. GIS equipment and software is constantly expanding in its capabilities, and demand for a service that GIS can provide continues to increase. Currently, the Data Group provides project services and assists other staff in the operation of GIS tools for their own projects. The Data Group also provides representation for the Branch in Agency-wide coordination of GIS integration. Group staff also works with the Agency GIS Coordinator to maintain current geographic layers to be used in the GIS system.

Data Requests
Approximately 115 formal data requests from interested parties outside of the Section were received and filled. These requests required effort ranging from simple verbal replies to complicated data extractions from Section databases. An estimate of total staff time required to respond to these data requests is placed at 115 hours.

Surveys Data Group (Continued):

Accomplishments in 2000

Data requests are acknowledged within 7 days. A time frame of 2 weeks has been established to supply requested information to the less complicated requests, while more complicated inquiries may take longer to complete.

Implementation of Assessment Branch Database

Major development and implementation of a new Branch data management system called AIMS (Assessment Information Management System) took place during year 2000. 152,646 records from 36 tables were migrated into AIMS. This accounts for about 90% of Surveys data that is available in electronic format. Biological Studies data sets are in the process of being migrated and are expected to be of similar size and complexity. The Data Group has worked closely with the database development contractors, serving as an intermediary between the contractors and Assessment Branch personnel. Staff has assisted the database developers in understanding the business processes of the Branch, analyzing data, and migrating data to the new system.

Implementation of new Software

The Agency began the transition from Corel Office Suite to Microsoft Office 97. During the conversion, the Data Group assisted with the installation and continues to be available to assist staff with data conversion.

Goals for 2001

The year 2001 is expected to continue to introduce changes to the way that the Data Group will complete assigned tasks. The heavy reliance on technology brings an inherent need for the staff to be flexible in mastering new skills and diligent in honing existing ones.

Report Publication

Approximately 22 reports are currently in some stage of the publication process within the Surveys Section. It is expected that the majority of these reports will be completed and published during the coming year.

Documents Published on the Internet

One of the Data Group's goals in the coming year is to place the new reports cited above, as well as the balance of approximately 17 existing Surveys reports on the web for public access. In addition, assistance will be given to other Sections within the Assessment Branch to place their completed documents on the web.

Completion of AIMS

Completion of AIMS will dramatically improve response capabilities to data requests and allow greater access to the data for analysis. Automatic data entry of contract lab results and user friendly interfaces will improve staff efficiency throughout the Assessment Branch. Assistance will continue to be provided to the database contractors to develop standardized outputs from AIMS such as field collection sheets and annual data reports. Data migration and verification will occupy a significant amount of staff time during the coming year, as will providing Branch staff with assistance in database applications during the sampling season.

GIS capabilities

More time will be allotted to help Branch staff develop and enhance their own personal skills in using GIS to its full potential. With more integration of GIS tools into the activities of the Surveys Section and Assessment Branch staff, the Data Group can concentrate on coordination and integration of the Survey's data with the rest of the OWQ and eventually the Agency.

Biological Studies Section

Responsibilities and Organization

The Biological Studies Section (BSS) is responsible for determining the biological integrity of aquatic communities in Indiana lakes, rivers and streams. They do this through a variety of field, laboratory, and cooperative studies that involve several different forms of aquatic life as well as surface water and sediment chemistry, physical and habitat information. These data are used to determine compliance with the existing narrative biological criteria in the Indiana water quality standards, and form the basis for new specific numerical biological criteria. Additionally, the data determine the extent of ecological harm and recovery, and make correlations to physical and/or chemical impairments that may occur.

The BSS conducts fish tissue and sediment sampling to assess the level and extent of contamination by toxic and bioaccumulating substances whose concentrations in other environmental media are often too low to be easily measured with routine sampling and laboratory procedures. The fish tissue monitoring program provides the majority of data used to make decisions for Indiana's fish consumption advisories. In addition these data are also used for wildlife health risk assessments for fish-eating birds and mammals, and to provide the information needed to develop models to assess changes in Indiana ecosystems that affect aquatic life and human health.

The BSS oversees lake monitoring efforts conducted under contract by staff and students of the Indiana University School of Public and Environmental Affairs, as well as by a group of trained volunteer monitors. Both programs include the monitoring of physical, chemical and/or biological parameters useful in assessing the impacts of nutrients in Indiana lakes and reservoirs.

The results from those monitoring and assessment programs are used in the Indiana 305(b) Report (aka: Indiana Water Quality Report 2000). The benthic macroinvertebrate Index of Biotic Integrity (mIBI), Qualitative Habitat Evaluation Index (QHEI), fish community Index of Biotic Integrity (IBI), sediment contaminants, and Indiana Trophic State Index (TSI) (lakes and reservoirs only) are five of the nine parameters used for determining the Aquatic Life Use Support (ALUS) in the 305(b) Report. The TSI is the sole parameter for determining ALUS for the lakes and reservoirs in the 305(b) Report. The Indiana Fish Consumption Advisory is the sole parameter for determining fish consumption use support in the 305(b) Report. The criteria used in the 305(b) Report are listed in Table 5 of the Report.

Accomplishments in 2000:

Watershed Monitoring Program:

The Section participated in the implementation and continued assessments of the Watershed Monitoring Program of the Office of Water Quality's (OWQ) Surface Water Quality Monitoring Strategy. Biological assessments were conducted in the Great Lakes Drainage Basin and Ohio River Valley Basin watersheds. A statistically valid number of sites were selected, with the help of U.S. EPA-ERL Corvallis, to evaluate the biological condition of each watershed using both fish communities, macroinvertebrate communities, and fish tissue contamination levels as the indicators. Samples and data from both watersheds are scheduled for laboratory processing and evaluation during winter of 2000-2001.

White River Fish Kill/Contamination Incident:

The Biological Studies Section became involved with this incident on December 21, 1999. Their activities involved collecting fish samples for analysis by the Animal Disease Diagnostic Laboratory at Purdue University; sediment and fish tissue samples for analysis by our contract lab (En Chem, Inc of Madison, WI). We also sampled the macroinvertebrate community during and after the incident. Staff provided rudimentary boating safety instructions, personal flotation devices, and boats to OLQ employees and their contractors. Staff devoted a great deal of time operating watercraft during the dead fish cleanup activities at the tail end of the event. We conducted water quality and visual observational surveys upstream of, within, and downstream of the kill zone. Staff also provided numerous hours of technical support for the senior management team and technical staff of IDEM and IDNR and participation in public meetings related to the incident.

The Warehouse Burglary

It was discovered that the IDEM Warehouse had been burglarized on Monday morning March 27, 2000. The Biological Studies lost all 3 of its 5000 watt portable generators used for electrofishing as well as five outboard engines. The Department was able to acquire replacements under emergency procurement procedures so that all equipment was available by the time the field season started in the summer.

Personnel

During the year we acquired a new 180-day intermittent Environmental Scientist 3 position and have one on loan from the Environmental Toxicology and Chemistry Section. The Naturalist Aide 180-day intermittent position was reclassified to a Laboratory Technician 3. James Meek and Sara Ivie filled the Naturalist Aide/Laboratory Technician position; James B Turner filled the 180-day intermittent Environmental Scientist position; Andrew Selle took an approved un-paid leave of absence, returned for a brief while, and resigned to attend graduate school. Ronda Dufour resigned and Stacey Sobat was promoted into the position and Melissa Hall was hired to fill the Environmental Scientist position formerly held by Stacey Sobat.

Vehicles

We acquired a new 4-door 4-wheel drive Chevrolet pickup truck with a camper shell over the bed in 2000. The only accident during the year was a minor dent in the parking lot during the fish kill investigation.

Fish Community Monitoring Program

For the first 5-year cycle of the Surface Water Quality Monitoring Strategy, the Biological Studies Section completed stream fish community sampling for IBI calculations in all but the Patoka basin (which will be sampled in 2001). Three hundred and nine (309) sites across the State have been sampled for this effort. This Statewide coverage will enable staff to make statistically valid regional assessments on the quality of the river and stream fish community resources. This information will establish a comparative tool for monitoring and assessing the compositional, structural, and functional integrity of the river and stream fish communities of the watersheds.

A total of 90 fish community sampling events from 82 stream locations were completed in 2000 from both the Great Lakes basins and the Ohio River Valley Basin watersheds as part of the Watershed Monitoring Program. This represents a 100% completion of this planned activity. Voucher specimens from these sites will be confirmed during the winter of 2000-2001. Reports are forthcoming.

The Fish Community Assessment Program is two years behind schedule in calculating the Index of Biotic Integrity (IBI) scores in order to make assessments for the 305(b) Water Quality Report and the 303(d) Listing of Impaired Waterbodies. The program is behind schedule due to the White River contamination investigation (1999-2000), a switch in agency standard database software from Corel Paradox© to Microsoft Access©, and changes in personnel. A vendor is being contracted (A305-1-00-231) to assist with overcoming the backlog in data analysis, assist with the migration of historical data to the new database software, and to train staff.

The Biological Studies Section, the Water Quality Standards Section (formerly the Special Projects and Standards Section), and U.S. EPA Region 5 Water Division have recently completed a project to develop the Index of Biotic Integrity (IBI) for evaluating the fish communities in each of Indiana's six ecoregions. One document, the Interior River Lowlands, is still in draft. These studies set the regional calibrations for the development of Index of Biotic Integrity metrics for use in a standardized monitoring program. The results of this program, and those of the macroinvertebrate community and habitat assessment programs, are forming the

Fish Community Monitoring Program (Continued):

calibrations for reference conditions and identification of reference sites. These calibrations provide the relative expectations for assessments of the biological integrity of the water resources for the Surface Water Quality Monitoring Strategy.

Staff have been in the process of finishing the submittal of supporting documents compilation, errata and clarification statement for the USEPA Region 5 concerning clarifications in response to reviewers for the U.S. EPA report entitled, "Development of Index of Biotic Integrity Expectations for the Wabash River." This was done in response to questions/concerns regarding the above final report that was published and distributed in 1998. Questions had been raised regarding the technical validity of this report and the adequacy of the peer review. The EPA Region 5 Office could not locate the original peer reviews; thus U.S. EPA Region 5 conducted a new peer review in 2000 in accord with U.S. EPA procedures. This later review indicated a number of instances where clarification of the report was needed. The study was determined to be valid and accurate, and would be supported by U.S. EPA on condition of the clarifications.

Macroinvertebrate Community Assessment Program:

Lake Program staff joined efforts with Dr. Tom Simon and the Indiana Lakes Management Society (ILMS) to conduct a probabilistic-based sampling project. The purpose of the project was to determine if fish and insect IBIs (Index of Biotic Integrity) can be developed and calibrated for Indiana lakes and reservoirs. Staff invested many hours in pre-season planning efforts, construction and maintenance of macroinvertebrate traps, cleaning and repair of equipment; as well as post-season processing and handling of samples and equipment back in the lab. Macroinvertebrate samples were collected from 47 of 50 lake and reservoir sites visited around the state. In addition to the investigative samples outlined within the project's quality assurance plan, staff conducted paired studies within each lake to compare and verify sampling methodologies. Non-319 funds contributed by IDEM to this effort totaled 1210 work-hours (52 days, 32 nights in the field), 6036 vehicle-miles, and over $32,000 spent on field efforts alone. Much work remains to be done to finish this project in 2001.

A special macroinvertebrate study was conducted as a result of the White River Contamination Incident. Seven sites were sampled from Indianapolis to Anderson four times between January and October with a total of 37 samples collected and analyzed. A report is in preparation.

Kick samples were collected in riffle habitats at a total of 29 re-visit sites in the Great Lakes and Ohio River Basins. A total of 45 sites were visited, of which 16 were not sampled due to such things as dry streambed, riffles covered with sand/silt, or water depth exceeded 1 meter.

Kick samples were collected in riffle habitats at a total of 32 fish community sites selected by stratified probabilistic design. Twenty-four were in the Ohio River Valley watershed and 8 were in the Great Lakes watersheds.

Hester-Dendy Artificial multiplate samples were collected at a total of 10 sites in the Great Lakes and Ohio River Basins. Hester-Dendy's were placed at a total of 17 sites, of which 7 were not successful due to samplers being out of water or missing.

A total of 72 samples from the 1999 field season were processed to the family level of identification in 2000, mIBI scores were calculated and ALUS assessments made.

The Section participated in the review of requests for site-specific water quality criteria for waters influenced by NPDES discharges. In the course of its various monitoring and assessment field activities, the staff finds point and nonpoint source related problems which, were referred to the appropriate IDEM programs.

Fish Tissue and Sediment Contaminant Monitoring Program:

In 2000, a total of 190 fish tissue samples were collected from sites in the Great Lakes and Ohio River Valley watersheds. Sixty-six of these came from 48 probabilistic design sites (31 from the Great Lakes watersheds and 35 from the Ohio River Valley watershed) while 141 came from 28 targeted lakes and rivers. Sampling occurred on 52 waterbodies in 24 counties. Fish tissue sample collection fell short of its original goal. The Watershed Monitoring Program attained a 65% overall success rate at bringing back primary target species tissue samples and 45% success at bringing back secondary target species tissue samples from probabilistic draw sites. Samples were collected from 56% of the originally planned target sites. It is important to note that there would not have been enough laboratory contract funds if 100% efficiency at visiting all listed sites for 1999 and bringing home samples from them would have occurred. The list of targeted sites is always a very ambitious list given limitations in analytical services funds as well as staffing. Adjustments are made by the project manager as the field season progresses in order to stay within the boundaries of these limitations. This can include adjusting the number of sites, number of samples from sites, and analytical tasks requested. As far as analytical funds are concerned, for the biennium (SFY2000-2001) we are expected to spend 99+% of the laboratory services budget for this program.

29 aquatic sediment samples were collected from 26 sites in 13 counties for contaminants analyses. This included a number of the major Ohio Valley tributaries to the Ohio River, Grand Calumet River/Indiana Harbor Canal, St. Joseph River (Lake Michigan drainage), St Marys, Maumee, and St. Joseph (Lake Erie drainage) rivers. One hundred percent of planned objectives in sediment sampling were completed for field season 2000.

The Section participated in fish tissue collections on the Ohio River with the Ohio River Valley Water Sanitation Commission (ORSANCO). These collections occurred in the Markland, McAlpine, and Cannelton pools. Staff also has continued participation in the biological subcommittee of the technical committee of ORSANCO, and participation with other signatory states in working toward a uniform fish consumption advisory for the Ohio River mainstem.

Staff participated in the first year sampling round of the U.S. EPA's national study on fish tissue contaminants in lakes and reservoirs across the nation. Only one private lake needed to be sampled in 2000 for Indiana. Staff collected fish tissue samples and sent them to a EPA procured contract laboratory.

Laboratory services for fish tissue and sediment contaminant monitoring had to be put on hold in October. An error was discovered that amounted to half of the funding normally allotted for the biennium of the fish tissue and sediment contaminants laboratory services contract being written into the current contract (A305-9-99-319-0). An amendment to the contract for $176,000 in additional funds to analyze the field year 2000 samples has been signed by the contract laboratory and was in the final signing process by the State at the end of 2000. The contract laboratory is En Chem, Inc. of Madison, WI.

During 2000 the 1999 fish tissue contaminant results were reviewed for quality assurance and computerized. Historically there has been a 15-month time lag between sample collection and the results being incorporated into the Indiana Fish Consumption Advisory. The 1999 results will be incorporated into the 2001 FCA. Mercury and PCBs are the contaminants that currently form the basis for the FCAs in Indiana.

Staff have been evaluating the contaminant results of fish tissue samples collected from the stratified probabilistic sites. It is hoped that this sampling effort will yield information that will support indicator development by which to objectively monitor for trends over time with bioaccumulating contaminants on a regional scale.

Fish Tissue and Sediment Contaminant Monitoring Program(Continued):

Staff finalized the report "Creek Chub as a Sentinel Indicator Species for Relative Regional Assessment of Mercury Contamination and Monitoring Pollutant Trends in Indiana Rivers and Streams" (Stahl and Sobat 2000). The purpose of this report was to evaluate the first two years of mercury analytical results in creek chub. The whole fish-tissue samples were collected from probabilistic sites to estimate the proportion of creek chub exceeding a critical value for mercury risk to wildlife. With the information on cumulative distribution frequency of mercury levels in creek chub from three watersheds, inferences can be made that as many as 40% of creek chub from first, second, and third order streams in the three watersheds may have mercury levels that could pose a risk to avian fish eating wildlife and 15% to mammalian predators of fish. The report is posted on the IDEM Internet site.

The Assessment Branch in the Office of Water Quality was asked to respond to a request for Applicable or Relevant and Appropriate Requirements (ARARs) pertinent to the Shelly Ditch Site, Time-Critical Removal Action, Crawfordsville, IN. A site removal target level, which includes in-stream sediments, of 10 ppm for total PCBs and 400 ppm for lead had been proposed by the U.S. EPA Region 5 On-Scene Coordinator. Staff recommended the use of sediment quality criteria (SQC) based on equilibrium partitioning, effect ranges, or apparent effects thresholds as listed in this response for total PCBs and lead target "clean up" levels. The use of the U.S. EPA suggested 10 ppm clean up level for in-stream sediment PCBs was considered adequate only for protecting aquatic life based on the application of the Chronic Aquatic Criteria (CAC) aquatic life value in the State water quality standards to an equilibrium partitioning model and sediment organic carbon concentrations greater than 0.5%. This was however, not protective of human health. As long as measurable levels of PCBs continue to be present in Shelly Ditch it is almost certain that fish consumption advisories downstream in Sugar Creek will continue for the long-term future. This is a threat to public health. Staff recommended the use of a SQC target that considers human health in its derivation as an applicable or relevant and appropriate requirement (ARAR). An SQC for PCBs of 0.70 ppm was recommended to be appropriate. With respect to lead, sediment clean up level of 200 ppm that would be protective of aquatic life and probably of human health was recommended.

BSS staff have been collaborating with Dr. Charles Santerre, Ph.D. of Purdue University's Food and Nutrition Department to assist him in his research of developing solid phase extraction techniques to be used in enzyme linked immunoassays (ELISA) for PCBs and eventually other organochlorine contaminants in tissue. Future outcomes of the research could mean more cost effective and timely analysis for PCBs in fish tissue or other complex biological matrices. It may also have direct application for cost effective screening in the commercial fish market.

Staff has also been cooperating with IL-IN Sea Grant on a project in the St. Joseph River Basin (Lake Michigan). Their proposal plans to evaluate the effectiveness of Semi-Permeable Membrane Devices (SPMDs) under a range of environmental conditions to determine their usefulness as indicators of PCB exposure in fish. SPMDs consist of a thin film of neutral lipid (triolein) enclosed in a thin-walled lay flat tubing made of low density polyethylene have been used for passive monitoring of hydrophobic organic contaminants such as PCBs, PAHs and organochlorine pesticides. The polyethylene tubing mimics a biological membrane in its ability to selectively diffuse organic compounds. Triolein is a major non-polar lipid found in aquatic organisms. This biological body fat is where hydrophobic organic contaminants can accumulate in aquatic organisms. The SPMD have allowed investigators to detect the presence of specific compounds in air and water. Also, they have been used to compare apparent availability of a contaminant to realized accumulation in biota, estimate the relative contribution of water and sediment on bioaccumulation , and determine spatial trends of contamination in aquatic environments . Our portion of the plan was to collect fish tissue samples from the St. Joseph River in relation to sampling locations of the SPMDs.

Fish Tissue and Sediment Contaminant Monitoring Program(Continued):

Staff submitted an informational article co-authored with Dr. Tom Simon, Ph.D. "A Risk-Based Approach: Understanding Underlying Assumptions of FCAs" for *LakeLine*, a North American Lake Management Society (NALMS) publication. The article was published in the winter 2000-2001 issue Volume 20, No 4.

Lake Monitoring Program:

The Biological Studies Section provides agency oversight and management of the Indiana Lakes Program. Overall coordination of this program continues to be contracted out to the Indiana University School of Public and Environmental Affairs (IU/SPEA) under the direction of Mr. William Jones through Section 319 funding. During 2000 the program conducted lake water quality assessments on approximately 75 lakes, coordinated volunteer monitoring efforts on 114 lakes, and published 4 issues of *Water Column* newsletter.

Staff continued to support the efforts of the Indiana Lakes Management Work Group (26-member legislative work group) through printing and distribution of 600 copies of their final report. Staff also prepared and framed recognition certificates presented to the Work Group by the Indiana Lakes Management Society (ILMS).

Staff coordinated a statewide distribution of volunteer water monitoring videos to libraries and state repositories. These videos were produced by ILMS and the Collaborative Resource Alliance for Water Quality Data (CRAWDAD) using a grant from Section 319 funds.

Staff closed out a $130,000 contract with IU/SPEA for the 1998-99 lake sampling seasons. In May 2000 a new $130,000 contract began for sampling years 2000-2001. Additional federal Section 319 monies have been secured in the amount of $240,000 with a contract to be drafted later this year. This is to ensure that some level of lake monitoring continues through the year 2004.

Efforts were made on behalf of ILMS to conclude $12,000 and $16,720 grants to produce a video and conduct conferences and workshops, respectively.

Cooperated with and supported efforts of other Agency staff serving on the EPA-5 RTAG (Regional Technical Advisory Group) in regards to developing Nutrient Criteria.

Staff conducted paired sampling studies during lake macroinvertebrate project (outlined in the Macroinvertebrate Monitoring Program section above) to compare and verify sampling methodologies.

Staff contributed about two-thirds of the Branch's field time and field related work associated with the Eagle Creek Reservoir fish kill during the summer of 2000.

Staff finalized the report: "A Comparison of the Mid-Water Planktonic Invertebrate Communities of Eagle Creek, Geist, and Morse Reservoirs in Central Indiana Using Underwater Light Trapping" (Newhouse and Stahl 2000). The purpose of this report was to determine and compare the relative abundance of the populations of light-responsive zooplankton within three reservoirs. The impetus of this study was the fact that there had been a fish kill on Eagle Creek Reservoir, possibly in response to an algaecide application. The report is posted on the IDEM Internet site.

Lake Michigan:

Staff has worked on an Ecological Monitoring Efforts Survey for the Lake Michigan Basin that had been requested of programs by the Great Lakes Commission. This assessment compiled information on all relevant aspects of the ecosystem, rather than just water quality indicators. The resulting database from the project will assist decision makers and resource managers at all levels to target limited financial resources to critical monitoring needs. It will also be used to assess monitoring needs in the basin.

Outreach:

The Biological Studies Section believes that public outreach, education, and participation in professional organizations are major tools that we can use to help make Indiana a cleaner, healthier place to live. The following activities illustrate the benefits of outreach.

During the past year, the BSS spent significant time in outreach and public education on our watershed monitoring program. The Section continued to contact and provide information to property owners while sampling fish and macroinvertebrate communities at probabilistic design sites. This included the distribution of over 900 informational brochures handed out or mailed to landowners and local, state, and federal government offices in the Great Lakes and Ohio River Valley watersheds for 2000 activities. Twenty-two (22) letters of gratitude with a summary of results were mailed to landowners for 1999 field activities in the lower Wabash River and Kankakee River watersheds.

Staff completed work in the Northwest Indiana Area of Concern (AOC) and prepared a publication manuscript for scientific presentation and review, in cooperation with the U.S. Fish and Wildlife Service and Army Corp of Engineers. The publication is entitled: Ecological Recovery Endpoints Using the Compositional Integrity of the Fish and Macroinvertebrate Community Based on Faunal Distribution Records, as a major contribution to Ecological Recovery Endpoints for the Grand Calumet River and Indiana River Harbor Canal (Simon, T.P., S.A. Newhouse, R.L. Dufour. 1999). The publication was accepted for presentation at the North American Benthological Society's annual meeting in the Spring of 2000. This project is in support of the Grand Calumet River/Indiana Harbor Canal Sediment Cleanup Restoration Alternative Project Report. Staff participated because of their expertise in efforts to develop indices of biological expectations for Indiana rivers and streams.

The Assessment Branch's probabilistic sampling and landowner contact was featured in the May-June 2000 edition of the *Indiana Environment and Materials Exchange* periodical.

The Biological Studies Section's macroinvertebrate community assessment program was featured in the July-August 2000 edition of the *Indiana Environment and Materials Exchange* periodical.

Numerous contacts were made while conducting the lake macroinvertebrate sampling effort in 2000. Local landowners, lake users, property managers, law enforcement officers, tourists, association members, volunteer monitors, businesses, and school-age children were encountered during the 4-month field season. Considerable time was spent conversing with and educating them all about lake ecosystems and IDEM's efforts to monitor the health of these valuable systems. Many people left contact information in order to receive feedback and/or final reports from this project, conducted in cooperation with ILMS (see Lake Monitoring Program section for further description).

Staff held their 12th annual Indiana University SPEA Limnology Class, with Professor Bill Jones, field trip on electrofishing. This field laboratory exercise demonstrates an important sampling technique, aids the students in taxonomic practice of Indiana's ichthyo-fauna, and allows us (IDEM) to showcase the biotic work we do in aquatic community and ecotoxicology assessments to the students. There are approximately 40 to 45 students in this class each year. A number of students over the years have subsequently come to work for IDEM. The field trip was November 17th and was staged on White Lick Creek at Brooklyn, IN, Morgan County.

Staff continued to partner with the Indiana Lakes Management Society (ILMS) to conduct the 12th annual Indiana Lake Management Conference at Lake Wawasee in April (Sec. 319-funded). Two fall workshops were also organized and held in Seymour and Plymouth, IN. All events were well-attended and well-received by lake users and homeowners.

During the year, the Biological Studies Section staff gave oral and/or multi-media presentations at several Indiana elementary schools, middle schools, high schools, education summer camps, colleges, as well as various conferences and professional work groups. Staff also served as visiting scientists at several schools participating in the *Hoosier Riverwatch* Program.

Outreach (Continued):

Staff gave a Watershed Demonstration of sampling methods to IDEM senior staff and interested public on the Little Elkhart River at Bonneyville Mill Park in Elkhart County. Lake staff updated photos and text on a display unit, as well as secured educational brochures for use by the Indiana Lakes Management Society.

Biological Studies staff continues to participate in professional society activities. These include, but aren't limited to the Indiana Academy of Science (IAS), the North American Lake Management Society (NALMS), Indiana Lakes Management Society (ILMS), and the American Fisheries Society (AFS). Additionally, the Indiana Chapter of the American Fisheries Society (IAFS), North American Benthological Society (NABS), International Association for Great Lakes Research (IAGLR); and the Society of Environmental Toxicology and Chemistry (SETAC). Two staff serve on the Natural Areas and Biodiversity Committee of the IAS and on the Board of the Indiana Biological Survey (IAS). One staff member serves as an officer of ILMS, a chapter of NALMS.

Other pertinent meetings attended include, ORSANCO Biological Water Quality Subcommittee, ORSANCO Task Force of Experts on Invertebrate Community Index (ICI) development for the Ohio River, and the U.S. EPA Region 5 Nutrient Criteria Regional Technical Advisory Group (RTAG) and Biocriteria.

Conferences and workshops participated in included: The 13th Annual Enhancing the States' Lake Management Programs held in Chicago; the Indiana AFS Redhorse Taxonomy Workshop; a workshop on Aquatic Plant Identification; Macroinvertebrate Community Sampling at the Ohio Valley Chapter of the Society of Environmental Toxicology and Chemistry; Natural Lake Fish Contaminant Monitoring Workshop; Bald Eagle in the Middle Wabash Corridor; 30th Anniversary Meeting of the Indiana Chapter of the American Fisheries Society; The Indiana Lakes Management Society; The Indiana Academy of Science; and Biodiversity Committee of the Indiana Association of Science.

Goals for 2001:

1. Prepare comprehensive Water Quality Reports on the upper Wabash River, lower Wabash River, and Kankakee River watersheds as well as the Great Lakes basins and the Ohio River Valley watershed. These will include regional characterization assessments of fish community biological integrity, regional characterization and assessment of fish tissue contaminants, assessing changes in aquatic macroinvertebrate communities since first sampling in the early 1990s, and development of baseline indicators for trends monitoring.

2. Develop and carry out a probabilistic and targeted sampling plan for biological assessment in the West Fork White River Basin and the Patoka River Basin as part of the OWQ year 2001 Surface Water Quality Monitoring Strategy.

3. Convert all currently computerized data on fish community and benthic aquatic macroinvertebrate accounts, habitat quality assessment scores, biological tissue and surficial aquatic sediment contaminant results, data collected for lake eutrophication index, lake volunteer monitoring, Lake and River Enhancement (LARE) diagnostic studies, and projects tracking information into the new Assessment Information Management System (AIMS) of the Assessment Branch.

4. Revisit identified reference sites identified from the Ecoregions IBI development project.

5. Finalize the document *"Development of Biotic Integrity Expectations For The Ecoregions of Indiana,* This will be the fifth of Indiana's six ecoregions (as defined by U.S. EPA ERL, Corvallis, WA) for which an IBI calibration for rivers and streams has been completed. The U.S. Fish and Wildlife Service will publish this document. Previously published companion reports for other Indiana ecoregions had been published and printed by U.S. EPA.

Goals for 2001(Continued):

6. Process and evaluate stream benthic macroinvertebrate samples that were collected during the 2000 field season. Collect samples in the West Fork White River and Patoka River Basins. Complete West Fork White River Contamination Macroinvertebrate Community Assessment Report. Write reports for 1996, 1997, 1998, 1999, and 2000 macroinvertebrate community assessments.

7. Continue laboratory efforts to decrease the backlog of raw aquatic macroinvertebrate samples (mostly CPOM samples) that have not been processed yet.

8. For the National Fish Contaminants Study on Lakes, staff will be collecting fish tissue samples from three lakes; Winona Lake in Kosciusko County, Geist Reservoir in Marion/Hamilton counties, and Turtle Creek Reservoir in Sullivan County. These are lakes selected through a stratified probabilistic design to assess lake fish tissue contamination on a National scale.

9. Prepare and implement the 2-year renewal option for the laboratory services contract (A305-9-99-319-0) for fish tissue and sediment contaminants.

10. Work cooperatively with staff at IU/SPEA and others to refine the Indiana Lakes Program to meet current needs. This will consist of possible revisions to the sampling plans, updating the Quality Assurance Project Plan for lake water quality assessment and volunteer monitoring efforts, supporting efforts to print and distribute another 5-year update to both the lake assessment and volunteer monitoring portions of the program, and continued efforts to input, maintain, analyze, and use 30-years of lake data into electronic format.

11. Draft contract in the amount of $240,000 for continued lake monitoring efforts through IU/SPEA. Look to secure additional funding for future years or additional types of lake monitoring.

12. Finish processing (sorting and identifying) lake macroinvertebrate samples. Submit data to Dr. Tom Simon (USFWS) for analysis and inclusion in final report for Sec. 319 Project ARN 305-99-28.

13. Continue to develop clearly-defined responsibilities and lines of communication between the Surveys Section, Environmental Toxicology and Chemistry Section, Water Quality Standards Section, and the Watershed Management Section of this and other branches as part of the Watershed Restoration Action Strategies.

14. Continue to develop clearly-defined responsibilities and lines of communication between other state, federal and interstate commissions including the Indiana Department of Natural Resources; U.S. EPA Region 5 and the Great Lakes National Program Office; U.S. Geological Survey- Water Resources Division in Indianapolis; the U.S. Fish and Wildlife Service Environmental Quality Division in Bloomington, IN; Natural Resources Soil Conservation Service, and ORSANCO.

15. Foster and encourage professional development of the Biological Studies Section staff by active participation in professional organizations, educational opportunities, and the presentation and publication of scientific information on Indiana's ecological conditions.

16. Work cooperatively with IDEM's Office of Land Quality in their development of a working relationship for laboratory and diagnostic services with the Animal Disease Diagnostics Laboratory.

Environmental Toxicology and Chemistry Section

Responsibilities and Organization

The Environmental Toxicology and Chemistry (ETC) Section is responsible to work on and provide technical support within the Office of Water Quality (OWQ) in the areas of General and Environmental Toxicology, Toxicity Evaluation and Risk Assessment, Quality Assurance and Quality Control (QA/QC) of water quality monitoring data, and also lead efforts in developing Total Maximum Daily Loads (TMDLs) for the waterbodies that are on the Indiana 303 (d) List of Impaired Waterbodies. The above works are completed through the accomplishment of the following objectives:

Assure that the State Water Quality Criteria (WQC) or Water Quality Standards (WQS) are employed through implementation of IDEM's National Pollutant Discharge Elimination System (NPDES) Permit Limits Monitoring Program with the purpose to improve and maintain good surface water quality and its designated uses.

Assess the potential of exposure and subsequent toxic effects of chemical pollutants or toxicants that are released into the environment through point or nonpoint source discharges and their impact on human health and aquatic life. This information is made available to customers, both within and outside IDEM, to prevent any environmental pollution.

Develop and implement the Total Maximum Daily Load (TMDLs) Program for the 208 Waterbodies that are on the 15 year schedule of the 1998 IDEM 303 (d) List of impaired waterbodies.

Provide quality assurance support to the Assessment Branch data collection efforts and analysis of environmental samples (Water, Sediments and Fish tissues) through compliance with the "Quality Assurance Project Plan (QAPP) For Indiana Surface Water Programs". This effort ensures that the environmental data collected for the various Water Quality (WQ) Monitoring Projects are of high quality and could be used with confidence in truly assessing the surface water quality.

Accomplishments in 2000

Environmental Toxicology and NPDES Permits Program:

Toxicity Biomonitoring and TRE Reports: A total of 84 Toxicity Biomonitoring Reports, (62 reports from Municipal Wastewater Treatment Plants (WWTPs) or Public Owned Treatment Works (POTWs), 21 reports from different Industries, and 1 Toxicity Reduction Evaluation (TRE) Report for the White River Fish Kill) were reviewed and evaluated for compliance to the NPDES limits for whole effluent toxicity and/or for renewal and issuance of the new NPDES permits.

Toxicity Evaluation and Development of WQC: Evaluated toxicity of 6 plus chemicals for toxicity and risk to human health and the environment. Developed Water Quality Criteria (WQC) for 4 or more chemicals for use in the NPDES Permits Program for the protection of aquatic life and human health.

Metal Translator Proposals and Site-specific WQC: A set of 2 Study Plans and/or Study Reports submitted by different Permittees for development of a Metal Translator for several metals were evaluated and implemented through the NPDES Permitting Program for select dischargers.

Site-specific WQC for select parameters like Lead, Copper and Ammonia were Recalculated and provided to the NPDES Permitting & Restoration Branch for use in the NPDES Permits for dischargers located both within and outside the Great Lakes Basin.

White River Contamination and Fish Kill: Following the incidence of Fish Kill in White River various toxicological data were gathered to assess the impact of suspected toxic pollutant and its by-products on aquatic life, human health and wildlife. Simultaneously, several water samples were tested at one or more Contract Aquatic Toxicology Laboratories, and all the toxicological data received were evaluated for toxicity against several aquatic organisms. Concurrently, numerous Summary Reports, Fact Sheets and Toxicity Evaluation Reports (8) were developed to explain the aquatic toxicological results for relevance to fish kill in the White River. This project also involved sampling of White River Water and other Source Water for chemical and physical analyses for hundreds of inorganic and organic chemicals. Data from all these analyses were timely compiled in a tabular form(100 plus pages Spread Sheet) to analyze and interpret the analysis results and also to use them for presentations in Public Meetings and for evaluation by IDEM's Management.

QA/QC of Water Quality Monitoring Data:

Fixed Station Monitoring: Quality assurance of analytical data for 2127 Water Samples collected from 160 Fixed Stations located in various rivers, streams and lakes in different parts of Indiana was completed. The water samples were analyzed for several parameters which included General Chemistries, Nutrients, Metals and *E. coli*. A total of 173 QA/QC Review Reports for the 173 data Packages received from the ISDH Contract Lab for this project were prepared and distributed.

Watersheds Monitoring: Quality assurance of analytical data from 512 Water Samples collected from the Great Lakes, Ohio River, Kankakee River and Lower Wabash River Basins were completed. Water samples were analyzed for several General Chemistry and Trace Metal parameters. A total of 62 QA/QC

Review Reports were prepared and distributed for these projects:

Wasteload Allocations and Special Projects: Quality assurance of analytical data from 6 Data Sets consisting of 39 Water and 2 Sediment samples collected for the wasteload allocation studies from Greensburg MWTP, Morgan Packing (Austin); Log Lick Creek (Florence); Capitol Products (Newton County); and Hartford City were evaluated in accordance with the Quality Assurance Project Plan and IDEM's BAA 97-44. Six QA/QC Review Reports for the 6 Data Sets from the wasteload allocation studies were prepared and distributed.

Pesticides Monitoring Project: Quality assurance of analytical data from 274 Water Samples collected for the Pesticides Monitoring Project in the Great Lakes and Ohio River Basins was completed. These water samples were analyzed for approximately 150 Pesticides for assessing the surface water quality and track the probable nonpoint sources of pesticides pollution. A total of 11 QA/QC Review Reports were prepared and distributed for this project.

Sediments and Fish Tissues Monitoring: Quality assurance of analytical data from 103 Sediment Samples and 299 Fish Tissue Samples collected from various locations and waterbodies all across Indiana was completed. The sediment and fish tissue samples were analyzed for numerous parameters such as Volatile and Semi-Volatile Organic Compounds, Pesticides, Metals, PAHs, and PCBs, etc. Twenty QA/QC Review Reports were prepared and distributed for this project.

Compliance/Inspection Monitoring: Quality assurance of analytical data from 9 Water Samples collected for the NPDES Permit Compliance/Inspection sampling from various streams and locations was completed. Four QA/QC Review Reports were prepared and distributed.

Lake Michigan/Maumee River TMDLs Projects: Quality assurance of analytical data from 803 Water Samples collected from Lake Michigan, Maumee River Basins and several other Watersheds received from the ISDH Contract Lab was also completed. Fifty eight QA/QC Review Reports were prepared and distributed for this project.

QA/QC of Water Quality Monitoring Data (Continued):

GCR/IHC TMDL Project: Quality assurance of analytical data from 53 Water Samples collected from the Grand Calumet River/Indiana Harbor Canal (GCR/IHC) was completed. Five QA/QC Review Reports were prepared and distributed for this project.

White River Contamination Investigation: Quality assurance of analytical data from 25 Data sets consisting of 92 Water Samples collected for an investigation of a massive fish kill incident in the West Fork of the White River were evaluated in accordance with the Quality Assurance Project Plan (QAPP) and the BAA 97-44. Twenty-five QA/QC Review Reports for the 92 water samples from the White River investigation were prepared and distributed. Additionally, analytical data from 54 Sediment samples and 8 Fish Tissue Samples collected for the White River Contamination Investigation were also evaluated and QA/QC'd. The sediment and fish tissue samples were analyzed for numerous parameters such as Volatile and Semi-Volatile Organic Compounds, Pesticides, Metals, PAHs, and PCBs, etc. and a subtotal of Ten QA/QC Review Reports were prepared and distributed (Total Reports for this Project, 25 + 10 = 35).

WQ Monitoring and Total Maximum Daily Loads (TMDLs) Programs:

WQ Monitoring and TMDL Work Plans: In 2000, Surveys and Environmental Toxicology & Chemistry Sections of the Assessment Branch planned and executed sampling for several WQ Monitoring Projects in the Kankakee River, Ohio River, Maumee River Basins and in the Lake Michigan areas for the TMDL Program. 28 Work Plans (6 for WQ Monitoring and 22 for TMDL program) were prepared for sampling and analysis of water samples in the designated watersheds. All these works plans were reviewed by QA/QC staff in the ETC Section for organization, planning, analytical test methods and detection limits for each parameter of concern for the WQ Monitoring and TMDLs projects. Initiated efforts in collecting data for developing TMDLs from waterbodies that are on the 1998 IDEM 303 (d) List of impaired waterbodies. In 2000, the following works were accomplished for this program

Sampling For the TMDLs:

For the TMDL Program 17 stream segments in the Lake Michigan, and Maumee River Basins were sampled between the months of June and November, 2000. Additional three streams in the Ohio River Basin were sampled during this same time period. Streams listed for *E. coli* impairments were sampled 5 times at equally spaced weekly intervals in a 30-day period. Streams impaired for chemical parameters were sampled 3 times during the season, approximately 6 to 8 weeks apart. A complete List of all the Major River Basins and Stream Segments Sampled in 2000 for the TMDL Program is presented below.

MAJOR RIVER BASINS AND STREAM SEGMENTS SAMPLED IN 2000 FOR THE TMDL PROGRAM

Major Basin	Segments	Parameters	Date Sampled
Lake Michigan West	Little Calumet River - Porter to Chesterton	Cyanide, Pesticides, *E. coli*	7/31-8/28
	Burns Ditch	Pesticides, Lead, E.coli	7/31-8/28
	Salt Creek	*E. coli*	9/25-10/23
	Trail Creek	*E. coli*, Cyanide	8/7-9/5
Lake Michigan East	St. Joseph River	*E. coli*	9/25-10/23
	Elkhart River	*E. coli*	9/25-10/23
	Crawford Ditch	Copper, Oil	7/18, 9/19, 11/01
	Mathers Ditch	D.O., Endrin	7/24, 9/25, 11/13
	Orland Tributary	D.O.	8/15, 10/3, 11/27
	Mud Creek	Ammonia, D.O.	7/5, 9/25, 11/01
Maumee	Garrett City Ditch	Ammonia	7/10, 9/13, 11/14
	Cedar Creek	*E. coli*	8/21-9/18
	Tiernan Ditch	D.O.	7/19, 9/18, 11/20
	Swartz-Carnahan Ditch	D.O.	7/19, 9/18, 11/20
	Blue Creek	D.O.	7/11, 9/12, 11/13
	Habegger Ditch	Ammonia	7/10, 9/13, 11/14
Ohio River	Pigeon Creek	Chlordane, Organics	6/28, 8/7, 10/16
	Little Pigeon Creek (Dale)	D.O.	6/12, 8/1, 10/10
	Cypress Creek	Chlordane-sediments	6/7, 9/18

Members of the Northwest Indiana *E. coli* Task Force have sampled the swimming beaches of the Indiana Shoreline of Lake Michigan during the 2000 recreational season.

TMDL Development:

Kokomo Creek TMDL: A formal report on Kokomo Creek TMDL was prepared by Tetra-Tech, a Contractor retained by US EPA grant, to assist Indiana in preparing its first TMDL. Two public meetings were held in February and November, 2000. The official public comment period on the draft Kokomo Creek TMDL end on December 11. The final Kokomo Creek TMDL was submitted to EPA by December 29, 2000.

Grand Calumet River/Indiana Harbor Canal (GCR/IHC) TMDL: Work on the GCR/IHC TMDL continued this year. Six stakeholder meetings were held during the year. The US Army Corps of Engineers is in the final phase of completing the draft TMDLs for public comment and submittal to EPA early in 2001.

Fall Creek and Pleasant Run TMDL: For the Fall Creek and Pleasant Run Watersheds *E. coli* TMDLs, additional grant funding was secured to proceed with contracting. Contracts should be executed by early 2001.

TMDL Outreach and Education: Fifteen presentations were made about TMDLs and impaired waters to various legistlative, professional and government groups.

Miscellaneous Tasks Completed:

Broad Agency Announcements (BAAs): Three Broad Agency Announcements (one for the Assessment Branch Watershed Monitoring Projects, one for the Trace Metals Analysis which supports Clean Sampling and Ultra-Clean Analyses Techniques, and one for the TMDL Program) were prepared. Each BAA is required in order to secure analytical services from a Contract Laboratory.

Quality Assurance Project Plan (QAPP) Revision and AIMS Database: The Quality Assurance Project Plan (QAPP) for the "Indiana Surface Water Quality Monitoring Projects", is periodically updated to include several new parameters and to incorporate revisions to acceptable test methods for the Surveys Section and TMDL Projects or for the AIMS database.

Trace Metals Pilot Project Reports and Presentations: A scientific paper entitled *"Determination of Trace Metals in Ambient Waters at Water Quality Criteria Levels Using Ultra-Clean Techniques"* was prepared. The paper was presented at the Indiana Water Resources Association Symposium held in June 2000 at Spring Mill, Mitchell, Indiana.

Additionally, for the 1998 Fall Creek Watershed Study for the Trace Metal Pilot Project a formal report was also completed. The main objective of this project was to establish within IDEM expertise in sampling ambient waters using Clean Sampling Techniques and analyze the water samples for dissolved and total metals using low detect Ultra-Clean analytical test methods.

Non-Rule Policy Document For Site-specific WQC: In June 2000, a 68 pages document entitled "General Procedures for Aquatic Toxicity Testing and Guidelines to Develop Site-Specific Water Quality Criteria" was prepared and distributed.

Monitor Contract Laboratory Activities: Section staff acted as Gatekeeper for all the analyses at various Contract Labs retained by IDEM. This year approximately 426 samples for Pesticides Monitoring, several hundred samples from 67 Fixed Stations Monitoring, 445 samples for the Watershed Monitoring, 808 samples for the TMDL Program, 340 samples for the Source Identification and 39 samples for the Enforcement action were submitted for Contract Lab analyses. The approximate laboratory cost for the year totaled over $654,000.

White River Fish Kill Activities: Extensive support was provided to the team investigating the fish kill on the White River extending from upstream of Anderson WWTP to Washington Street in Indianapolis. Staff coordinated with various laboratories to get quick turn around during the holiday season. Section staff also compiled all the analytical data and a list of all the sampling sites where either a sample was collected or the Hydrolab measurements were taken. These documents have been helpful in providing a big picture of all the sampling sites and the test results obtained.

Goals for 2001:

A. Toxicology and NPDES Permits Program:

Continue to evaluate Toxicity Biomonitoring and/or Toxicity Reduction Evaluation Reports (TRE) for NPDES permit limit compliance, for NPDES permits renewals, and/or for issuance of new NPDES permits.

Continue to evaluate and make necessary recommendations on site-specific WQC Study Plans and Site-Specific WQC development reports submitted by the regulated community.

Continue to work on the development of WQC for chemicals or toxicants for the NPDES Permitting program for which currently at National or State level no standards exist.

Continue to analyze and interpret toxicity of chemical toxicants and conduct risk assessment analyses for protection of aquatic life, wildlife and human health.

B. QA/QC Activities, Samples Tracking and Cost Analysis

Continue to perform Quality Assurance of analytical data for several chemical and biological parameters, received from contract analytical labs from the analysis of water, sediment, and fish tissue samples.

Continue to review analytical test methods for various chemical/biological parameters for the sensitive test methods with low detection limits.

Continue to act as the gatekeeper for tracking environmental samples for the Fixed Station Monitoring, Watershed Monitoring, Pesticides Monitoring, TMDLs and other Projects from the Surveys and ETC Sections of the Assessment Branch.

Continue to oversee and track contract cost for laboratory services for the analysis of environmental samples (water, sediments and fish tissues) and total cost related to TMDL activities.

C: The TMDL Program:

Staff will compile the data and information from the Task Force, and prepare a follow-up report. The Gary Sanitary District has received a 319 grant to sample the Little Calumet River through Gary during dry and wet weather events in 2001. The work plan for the 319 grant incorporated the TMDL specific parameters. The Little Calumet River through Hammond will be sampled in 2001.

Planning for the use of contractual support to work on the backlog of TMDLs will occur early in 2001. Funding to hire contractors will be available in March 2001, for Fall Creek and Pleasant Run TMDLs.

Staff will be developing work plans for impaired waters in the West Fork of the White River Basin. Planning for specific work in the sub-watersheds identified will be done in December. Approximately 33 stream segments are on the 2001-2005 section of the 303(d) list. This will be paired down, concentrating on grouping streams in the same sub-watersheds.

Office of Water Quality - Assessment Branch Personnel Listing

Assessment Branch		
Jan Henley	Branch Chief	308-3235
Brenda Hoffman		308-3206
Surveys Section		
Art Garceau	Section Chief	308-3381
Joel Armstrong		308-3196
David Arnold		308-3398
Tim Beckman		308-3195
Chuck Bell		308-3203
Steve Boswell		308-3201
Jim Butler		308-3199
Carl Christensen		308-3369
Sammy Gibson		308-3197
Roseann Hirschinger		308-3204
Mark Holdeman		308-3198
Cindy Martin		308-3081
Sherry Martin		308-3202
Ryan McDuffee		308-3194
Larry McFall		308-3200
Joanna Wood		308-3211
Lab Tech 3 Intermittent	Elizabeth Klicker	308-3361
ES4 Intermittent (Part time)	Amy Monaco	308-5076
ES4 Intermittent (Part time)	James Hoover	308-
Biological Studies Section		
Lee Bridges	Section Chief	308-3183
Anthony Branam		308-3184
Todd Davis		308-3188
Melissa Hall		308-3119
Carol Newhouse		308-3217
Steve Newhouse		308-3186
Stacey Sobat		308-3191
James Stahl		308-3187
Environmental Toxicology and Chemistry Section		
Dr. Ghias	Section Chief	308-3180
Mustafa Ak		308-3102
Timothy Bowren		308-3181
Julie Buening		308-3214
Christopher Haynes		308-3100
Jennifer Hutchison		308-3142
Kris Kehoe		308-3105
Dan Knowles		308-3399
Timothy Kroeker		308-3205
John “Corky” Prast		308-3237
Betty Ratcliffe		308-3182
Cyndi Wagner		308-3214
Staci Whipker		308-3387
Elaine Whitelaw		308-3197